Creeks Division Water Quality Monitoring and Research Program
Fiscal Year 2013 Research Plan

PROGRAM ELEMENT and QUESTIONS	METHODS/CONSTITUENS	SITES	FREQUENCY	NEW?
A. Watershed Assessment				
1. Is overall water quality, in terms of indicator bacteria and field properties, getting better over time?	FIB, field parameters, flow	Integrator Sites Honda and Lighthouse	Biweekly (26 x 4) Quarterly (4 x 2)	
2. How contaminated and/or toxic is sediment at storm drain outfall sites?	Metals, PAHs, Toxicity, Pyrethroids	8 creeks sites TBD	Yearly, in late summer	
3. Are pharmaceutical and personal care products (PPCPs) reaching creeks via irrigation runoff and water main breaks of reclaimed water?	Salinity and PPCPs	4 discharge sites if not completed in FY 11. Pending results, 2 creeks sites.	Summer 2012	
4. Is contaminated groundwater at cleanup sites reaching creeks?	Semivolatile organics	4 creek sites located in target areas	Summer 2012	
5. What is the source of the 303(d) impairment for Low Dissolved Oxygen on Mission Creek? How extensive in time and space is the impairment? (see Section C as well)	Nutrients, DO, Bioassessment, Algae cover	TBD, basd on Mission Lagoon results below.	TBD	
6. What is the source of the 303(d) impairment for Sodium and Chloride on Sycamore Creek? Is high conductivity near Chelham Creek from natural sources?	Conductivity, Sodium, Chloride	Creek walk, review geologic maps	As needed (~10 sample pairs)	New
7. Is high conductivity in Honda Creek from natural sources?	Conductivity, Sodium, Chloride	Test downstream site biweekly for conductivity. Creek walk, review geologic maps	As needed (~5 sample pairs)	New
8. What is the source of the impairment for toxicity on Mission Creek?	Toxicity Tests, especially algae	Quarterly sampling sites plus Mission Canyon	Quarterly (3x's during dry weather)	
9. What are the background daily cycles of water flow in Santa Barbara creeks? Is there a daily pumping in or removal of water from Arroyo Burro?	Review flow data, creek walk.	Lower Arroyo Burro	Summer 2012	New
10. Are new pesticides (pyerthroids and neonicotinoids) detected in dry conditions?	Pyrethroids, neonicotinoids	Integrator sites	Fall 2012	New
11. What are the impacts of reservoir flushing on metals?	Metals (total)	Sites TBD based on reservoir flushing	Fall 2012	
B. Storm Monitoring				
1. What are the highest concentrations of pollutants of concern during storm events, particularly seasonal first flush storms, in creeks?	Metals, Herbicides, Pesticides, Nutrients, Hydrocarbons, MBAS,	Integrator Sites and four storm drains	Yearly, first flush. Collect drain samples first, then creek samples.	
2. Do creeks and/or storm drains in Santa Barbara have problems with toxicity during storm events?	Toxicity (Vert, invert, algae)	As above.	As above.	
3. What are the loads of pyrethroids discharged from Santa Barbara creeks during storms?	Pyrethroids	Arroyo Burro at Cliff (location of flow gauge and autosampler)	Conduct composite sampling according to Caltrans (2008) during a 1" forecasted storm.	New
4. Is runoff from coal tar sealed parking lots more toxic than runoff from asphalt sealed parking lots?	PAHs, toxicity	4 sites, TBD	One storm, 2013.	New

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5. How do restoration/treatment projects impact water quality during storm events?	See Golf Course, MacKenzie Parking Lot, and Storm Water Retrofit Projects below.			
C. Restoration and Water Quality Project Assessment				
1. Westside SURF and Old Mission Creek Restoration				
a. Is the UV disinfection equipment functioning?	FIB and field parameters.	SURF Up, SURF Down, WSD, OMC W. Anapamu	Weekly during AB411 season.	
b. What percentage of flow in Westside Storm Drain is the facility treating?	Flow from WSD, pump records, camera			
c. Have habitat scores and index of biological integrity (IBI) scores in Bohnett Park improved?	Bioassessment			
2. Arroyo Burro Restoration, including Mesa Creek daylighting				
a. Have habitat and IBI scores in Mesa Creek improved?	Indicator bacteria and field parameters	AB at Cliff, Mesa upper, Mesa lower, AB Estuary upper, AB Estuary Mouth, AB Surf	Biweekly	
b. Has water quality in Mesa Creek continued to improve?				
c. How does Arroyo Burro Estuary biological integrity compare to other estuaries?	Bioassessment			
3. Hope and Haley Diversions				
a. Are human waste markers still found in Hope and Haley Storm Drains?	Human waste marker suite.	Hope Diversion, Haley Pump	Spring 2013	
b. What are the loads of fecal indicator bacteria (FIB) that are diverted to the sanitary sewer by these projects?	Indicator bacteria and field parameters	Hope Diversion, Haley Pump	Biannual	
4. Golf Course Project Performance (Storm) and Operation (Dry weather)				
a. Do treatment elements (Adams bioswale, East Basin, West Basin) reduce pollutant concentrations during storms?	FIB, nutrients, TSS	Paired samples: Adams bioswale, East Basin, West Basin	Three storms (not first flush)	
b. What is the quality of water discharged during spillover conditions (East Basin, West Basin)?	FIB, nutrients, TSS, toxicity	East Basin and West Basin spillways	Large storm.	
c. What are the temporal and spatial patterns of pH, temperature, DO, and conductivity in the East Basin during dry weather?	Sonde deployed in E. Basin, spot sampling	E Basin	Continuous	
d. What is the quality of water released prior to storm events from the East Basin and West Basin? What are the conditions in receiving water during releases?	Field parameters, FIB, nutrients, metals, hydrocarbons, pesticides, TSS, PAHs, and toxicity (PAHs only in sediment laden water, if observed).	E and W Basin releases, Las Positas Creek at Modoc	As needed.	
5. McKenzie Parking Lot LID Retrofit (Storm)				
a. Are basins functioning correctly?	Depth in basins, via logger.	MacKenzie Park	All storms.	
b. Is design storm fully infiltrated?	Visual observation during design storm.			
c. What are rainfall, storage, and draw down patterns?				
6. Debris Screens (Creek Walks)				
a. Has the installation of catch basin screens lead to decreased trash observed in creeks?	See Section E4			
b. Have the catch basin screens lead to decreased rotting plant material and/or FIB in storm drains?	See Section D4			
7. Mission Creek Fish Passage (Dissolved Oxygen)				

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a. What are the conditions in creek segments where fish spend time waiting for passage conditions (above or below passages)?	Data collected as part of Mission Lagoon work, below.			
8. Mission Lagoon Restoration and Laguna Channel Disinfection				New
a. Lagoon Inputs				
i. What does previously collected data show regarding nutrient input in Mission Creek and Laguna Channel?	Review existing data.			
ii. What are the current nutrient inputs (concentration and flow) from Mission Creek and Laguna Channel during dry weather?	Nutrient suite, DO, flow.	MC Montecito, LCC CPP	Biweekly (5 xs)	
iii. Does groundwater and/or nitrate enter Laguna Channel in the lower reach?	Nutrient suite, DO, flow.	LC Hwy 101, LC CPP	Biweekly (5 xs)	
b. Lagoon Water Quality				
i. What does previously collected data show regarding sediment contamination in Mission Lagoon and Laguna Channel?				
ii. What are the water quality conditions in the lagoon (DO, temperature, turbidity), at the surface and near the bottom?	Two sondes installed.	DO, temp, conductivity	Continuous data collection.	
iii. How do parameters respond to lagoon breaching and closing?	Same as above.			
iv. How does macro-algae cover and biomass change after the lagoon is closed?	Photos.	Carrillo and State St. Bridges	Daily to weekly	
v. What is the daily (weekly) condition of the estuary? Lagoon status, color, amount of floating algae?	Same as above.			
9. Storm Water Infiltration Retrofit Projects (Prop 84)				New
a. What are the baseline conditions for the project?				
i. What is the modeled post-development hydrograph?	Runoff modeling, testing for FIB, hydrocarbons, metals, pesticides, surfactants, toxicity. Field observation and GIS work for identifying reference sites.	TBD	First flush and two additional storms.	
ii. What are the concentrations of pollutants in runoff from the sites?				
iii. What is the toxicity of runoff from the sites?				
iv. What is the modeled pre-development hydrograph?				
b. Can we identify reference parking lots for which flow rates can be measured in addition to modeled? Include runon and runoff patterns in consideration of sites.				
10. Bird Refuge	On hold.			
a. What are baseline conditions for future restoration project?				
D. Source Tracking/Illicit Discharge Detection				
1. What are the causes of persistent beach warnings that occur?	FIB, ammonia	TBD, upstream from beach sits.	As needed, when 3 out of 4 beach tests show a warning.	
2. Will Laguna Channel and the East Side Storm Drain show that human waste markers have been eliminated after sewer line repair work is completed? See also Hope and Haley Drains above.	Human waste marker suite.	Laguna Channel under Hwy 101. East Side Storm Drain outfall.	Spring 2013	New
3. Is RV dumping a consistent problem in Santa Barbara?	Counts/observations of RVs in Santa Barbara, compared to number of RVs dumping legally at Marborg. Using calculations to estimate relative scale of	Blocks and parking lots frequented by RV dwellers.	Quarterly.	New
b. What is the scale of RV dumping (time, volume, percent of RVs in town)?				
c. How does RV dumping scale to other fecal inputs, e.g. leaking				

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sewers?	problem.			
4. What are the FIB patterns in storm drains that have been identified visually as "clean" vs. "debris-laden" during CCTV work?	FIB, ammonia	TBD, based on CCTV footage	TBD, Spring 2013	New
5. Does outfall screening show illicit discharges according to Center for Watershed Protection guidance (Creek Walks)?	Ammonia, FIB, MBAS	All discharges to mainstem creeks observed during creek walks.	Yearly	New
6. Are new hot spots emerging?	TBD			
7. Specific areas of concern: Barger Canyon, Las Positas Creek, San Roque	TBD			
8. Can we implement a report card system to create an alert for field and sample results that are concerning?	Review of exisiting data.			New
9. Can we develop a field testing kit for enforcement?	TBD			
10. What is the impact of reservoir flushing on metals and pH?	Metals, sediment.	Rattlesnake Creek and Reservoir outlet.	Single event.	
E. Creeks Walks/Clean ups				
1. Are there new problems in creeks that need to be addressed? Conduct outfall screening.	See section D.	All main stem creeks.	Yearly	New
2. Can we see anything unusual in lower Arroyo Burro, regarding flow patterns?	Creek walk, review existing flow data.	Lower Arroyo Burro	Yearly	New
3. Is the amount of trash in creeks decreasing over time?	Weight of trash removed each year.	All main stem creeks.	Yearly	
4. Has the installation of catch basin screens lead to decreased trash observed in creeks?	Continue measuring and marking GPS coordinates of trash.	Old Mission Creek and Lower Mission Creek (oak Park to beach)	Yearly	
5. Can we see any impairment to San Roque Creek, leading to drop in bioassessment scores?	Observation.	San Roque Creek, above Jesusita	Note if/when creek dries up.	Add San Roque to creek walks.
6. What is the conductivity pattern in tributary to Sycamore Creek?	See Section A			New
F. Bioassessment				
1. What is the baseline of biological integrity for benthic macroinvertebrates in creeks? 2. Are there differences between upper watershed and lower watershed sites? 3. Are there differences among watersheds? 4. How does the biological integrity in our creeks change over time? 5. How does the biological integrity respond to water quality and restoration projects? 6. What is the biological integrity of estuaries in Santa Barbara?	See Bioassessment Proposal and Reports.			